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NUMBERS OF U.S. DOCTORATES AWARDED RISE FOR SIXTH YEAR, BUT GROWTH SLOWER

by Mark K. Fiegener[1]

U.S. academic institutions awarded 48,802 research doctorate degrees in 2008, the sixth consecutive annual increase in U.S. doctoral awards and the highest number ever reported by the Survey of Earned Doctorates (SED). This number represents an increase of 1.4% over the 2007 total (48,112), the smallest annual increase over the 6-year span. Doctorates awarded in science and engineering (S&E) fields of study accounted for the overall growth in 2008 (figure 1, table 1).

Field of Degree

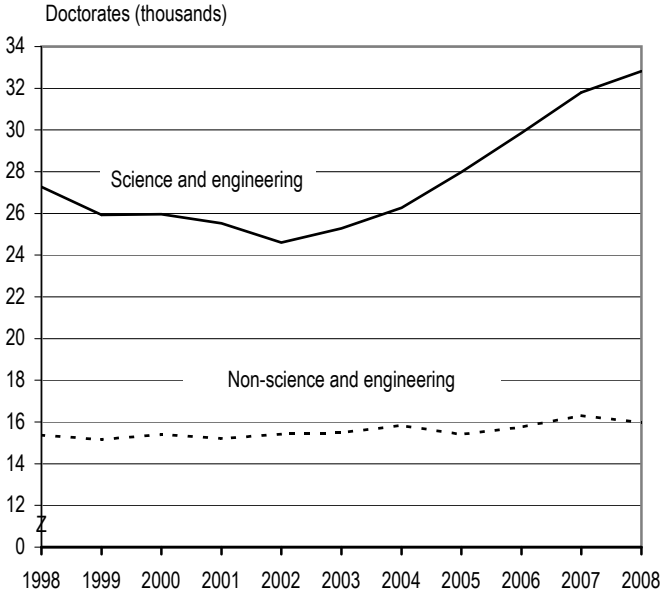
Science and Engineering

S&E doctorates totaled 32,827 in 2008 (67.3% of all doctorates), an increase of 3.2% over 2007 and 20.4% since 1998 (table 1). Growth has been the trend since 2003 in S&E doctorates awarded. Awards of doctoral degrees were up in five of the eight major science fields of study in 2008, with biological sciences having the greatest number of awards (7,793, or 16.0% of all doctorates) and showing the largest annual rate of increase (8.6%). Doctorates awarded in computer science increased 7.9% over 2007 and had the largest rate of increase among the science fields over the past decade, nearly doubling from 1998 to 2008.

Despite the 1-year declines in doctorates awarded physical sciences (-0.5%) and earth, atmospheric, and ocean sciences (-1.8%), degrees awarded in these fields have increased by 6.7% and 16.2%, respectively, since 1998. Although the number of psychology doctorates earned increased 2.1% in 2008, the total is 8.5% lower than it was in 1998 (3,673). The number of doctorates awarded in agricultural sciences is 3.9% lower than the number awarded in 2007, and 1.7% lower than the 1998 number.

The number of doctorates awarded in engineering fields reached 7,862 in 2008, a 32.8% increase over the 1998 total but a modest 1.5% increase since 2007. Other

FIGURE 1. Doctorates awarded in science and engineering and non-S&E fields: 1998–2008



NOTE: See table 1 for science and engineering (S&E) and non-S&E fields.

SOURCE: NSF/NIH/USED/NEH/USDA/NASA, 2008 Survey of Earned Doctorates.

engineering—which includes agricultural engineering, nuclear engineering, and nine other engineering subfields—was the fastest growing engineering field, with doctorates increasing 15.8% over the past year and 64.2% since 1998. Electrical engineering, the largest engineering field with 2,299 doctorate recipients in 2008, was the second fastest growing engineering field over the past decade (44.1% more doctorates awarded in 2008 than in 1998) even though doctorates awarded declined 4.6% from 2007 to 2008. Doctorates awarded

TABLE 1. Doctorates awarded, by major field of study, 1998–2008

Field	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
All fields	42,638	41,097	41,366	40,738	40,025	40,758	42,118	43,381	45,615	48,112	48,802
Science and engineering	27,274	25,931	25,966	25,529	24,608	25,282	26,274	27,986	29,863	31,800	32,827
Science	21,352	20,601	20,643	20,019	19,527	20,001	20,497	21,559	22,678	24,056	24,965
Agricultural sciences	1,109	1,065	1,037	977	1,009	1,060	1,045	1,038	1,033	1,134	1,090
Biological sciences	5,846	5,581	5,853	5,694	5,695	5,696	5,942	6,366	6,649	7,179	7,793
Computer sciences	927	856	861	830	809	867	948	1,129	1,453	1,656	1,786
Earth, atmospheric, and ocean sciences	742	706	665	630	671	647	671	714	757	878	862
Mathematics	1,177	1,083	1,050	1,010	919	993	1,076	1,205	1,325	1,393	1,400
Physical sciences[a]	3,824	3,579	3,407	3,396	3,205	3,323	3,350	3,643	3,927	4,102	4,081
Astronomy	206	159	185	186	141	167	165	186	197	223	248
Chemistry	2,216	2,132	1,989	1,982	1,923	2,040	1,986	2,126	2,362	2,325	2,247
Physics	1,378	1,271	1,204	1,198	1,123	1,080	1,184	1,331	1,368	1,554	1,586
Psychology	3,673	3,668	3,615	3,401	3,206	3,276	3,326	3,323	3,258	3,292	3,361
Social sciences	4,054	4,063	4,155	4,081	4,013	4,139	4,139	4,141	4,276	4,422	4,592
Engineering	5,922	5,330	5,323	5,510	5,081	5,281	5,777	6,427	7,185	7,744	7,862
Aeronautical/astronautical engineering	241	206	214	202	209	200	201	219	238	267	265
Chemical engineering	777	674	726	730	705	648	726	875	891	921	964
Civil engineering	650	584	556	595	630	674	673	758	804	865	865
Electrical engineering	1,595	1,478	1,544	1,579	1,393	1,466	1,651	1,851	2,133	2,409	2,299
Industrial/manufacturing engineering	229	211	176	206	230	214	217	221	234	280	281
Materials/metallurgical engineering	565	469	451	497	396	475	510	540	625	679	665
Mechanical engineering	1,022	855	864	953	827	814	852	978	1,146	1,128	1,139
Other engineering	843	853	792	748	691	790	947	985	1,114	1,195	1,384
Non-science and engineering	15,364	15,166	15,400	15,209	15,417	15,476	15,844	15,395	15,752	16,312	15,975
Education	6,569	6,551	6,437	6,349	6,503	6,643	6,633	6,225	6,120	6,444	6,578
Education administration	2,066	2,044	2,031	2,070	2,346	2,356	2,340	2,165	2,050	2,159	2,248
Education research	2,584	2,732	2,668	2,637	2,776	2,718	2,805	2,674	2,750	2,667	2,649
Teacher education	342	293	261	296	262	242	270	263	250	298	274
Teaching fields	954	893	824	723	686	714	758	663	707	879	909
Other education	623	589	653	623	433	613	460	460	363	441	498
Health	1,499	1,407	1,591	1,540	1,655	1,633	1,719	1,784	1,905	2,129	2,094
Humanities	5,275	5,197	5,384	5,350	5,223	5,194	5,162	5,100	5,239	4,997	4,641
English literature	1,600	1,516	1,612	1,493	1,455	1,416	1,407	1,389	1,457	1,357	1,421
Foreign languages and literature	643	626	642	620	627	623	587	607	615	608	627
History	946	960	1,019	991	983	895	927	881	917	889	921
Religion/theology	485	496	519	512	527	478	537	520	495	473	549
Other humanities	1,601	1,599	1,592	1,734	1,631	1,782	1,704	1,703	1,755	1,670	1,123
Professional fields	2,021	2,011	1,988	1,970	2,036	2,006	2,330	2,286	2,488	2,742	2,662
Business management/administration	1,177	1,111	1,070	1,067	1,114	1,037	1,254	1,170	1,311	1,506	1,437
Communication	407	418	434	431	429	457	473	517	540	591	587
Other professional fields	433	481	480	472	493	512	603	599	629	624	638
Unknown	4	1	4	0	0	0	0	0	8	21	0

[a] Field totals for 1998–2004 include other physical sciences fields not shown separately.

NOTE: Groupings of major fields and subfields of study differ from questionnaire and summary reports in that American/U.S. studies, archaeology, and history, science, and technology and society are in social sciences, not humanities; agricultural economics is in social sciences, not agricultural sciences; and public administration is in social sciences, not professional fields, according to National Science Foundation taxonomy.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Earned Doctorates, 2008.

in aeronautical/astronautical engineering and materials/metallurgical engineering also declined in 2008.

Non-Science and Engineering

The number of doctorates awarded in non-S&E fields fell to 15,975 in 2008, 2.1% below the 2007 total but up 4.0% over 1998. The number of doctorates awarded in education fields was up 2.1% from 2007, but doctorates declined in health (-1.6%), humanities (-7.1%), and professional fields (-2.9%) in 2008. The number of doctorates awarded in health grew substantially from 1998 to 2008 (39.7%), as did the number of doctorates awarded in professional fields (31.7%). However, the number of 2008 doctorate recipients in education is essentially unchanged from the 1998 total, and the number of humanities doctorates fell 12.0% from 1998 to 2008.

Demographics

Sex

The 3.2% growth in total S&E doctorates awarded between 2007 and 2008 reflected increased numbers of doctorates earned by both sexes, but women accounted for most of the growth (table 2). The number of female S&E doctorate recipients increased by 699 (5.7%) from 2007 to 2008, whereas the number of male doctorate recipients grew by 337 (1.7%). The numbers of all doctorate recipients in S&E fields increased each year between 2003 and 2008, but at a greater rate for women than for men over the 5-year period. S&E doctorates awarded to women in 2008 were 36.1% higher than in 2003; the total awarded to men increased 25.9% over the same period. As a result of these changes, the proportion of S&E doctorates

TABLE 2. Doctorates awarded, by selected characteristics of doctorate recipients: 2003–08

Characteristic	2003	2004	2005	2006	2007	2008
All doctorate recipients	40,758	42,118	43,381	45,615	48,112	48,802
Doctorate in science and engineering field[a]	25,282	26,273	27,945	29,844	31,768	32,804
Male	15,761	16,418	17,405	18,370	19,508	19,845
Female	9,521	9,855	10,540	11,474	12,260	12,959
U.S. citizen or permanent resident[b]	15,503	15,552	15,889	16,530	17,132	18,317
American Indian/Alaska Native	73	60	67	49	81	60
Asian	1,530	1,496	1,635	1,767	1,686	1,907
Black	662	753	706	742	789	824
Hispanic[c]	745	718	805	874	929	1,082
White	12,044	12,040	12,267	12,667	13,140	13,894
Multiple-race	217	225	244	291	319	326
Other[d]	232	260	165	140	188	224
Temporary visa holders	8,387	9,154	10,411	11,548	12,333	12,613
Doctorate in non-science and engineering field[a]	15,476	15,843	15,370	15,729	16,292	15,963
Male	6,494	6,546	6,330	6,649	6,668	6,426
Female	8,982	9,297	9,040	9,080	9,624	9,537
U.S. citizen or permanent resident[b]	12,186	12,139	11,840	11,890	12,099	12,217
American Indian/Alaska Native	64	71	73	71	62	63
Asian	516	565	550	620	644	636
Black	1,135	1,234	1,092	1,046	1,167	1,206
Hispanic[c]	685	583	626	637	721	683
White	9,519	9,386	9,216	9,277	9,201	9,314
Multiple-race	148	162	155	166	189	194
Other[d]	119	138	128	73	115	121
Temporary visa holders	2,208	2,468	2,420	2,607	2,794	2,633

[a] Individuals of unknown sex are excluded from totals.

[b] Individuals of unknown race/ethnicity are excluded from totals.

[c] Includes Mexican American, Puerto Rican, and other Hispanic.

[d] Includes Native Hawaiian/Other Pacific Islander.

SOURCE: NSF/NIH/USED/NEH/USDA/NASA, 2008 Survey of Earned Doctorates.

awarded to women increased from 37.7% in 2003 to 39.5% in 2008.

Men accounted for most of the decline in non-S&E doctorates awarded from 2007 to 2008, with awards to men in non-S&E fields falling by 242 (3.6%) compared with a drop of 87 (0.9%) for women. The number of women earning doctorates in non-S&E fields increased 6.2% from 2003 to 2008, and the number of awards to men declined 1.0% over that time. The proportion of non-S&E degrees awarded to women grew from 58.0% in 2003 to 59.7% in 2008.

Race and Ethnicity

A total of 4,423 U.S. citizens and permanent residents who are members of racial/ethnic minority groups earned S&E doctoral degrees in 2008 (table 2).[2] This number is 27.9% greater than the total reported in 2003 and 10.8% greater than the 2007 total. In comparison, numbers of white U.S. citizens and permanent residents earning S&E doctorates grew at roughly half of those rates, increasing 15.4% from 2003 to 2008 and 5.7% in the last year of that period. The proportion of S&E doctorate recipients of known race/ethnicity who are members of minority groups increased from 22.3% in 2003 to 24.1% in 2008. Asians constituted the largest group (43.1%) of minority S&E doctorate recipients in 2008, followed by Hispanics (24.5%), blacks (18.6%), individuals reporting more than one race (7.4%), and American Indians/Alaska Natives (1.4%).

From 2003 to 2008, the numbers of Asian (24.6%), black (24.5%), and Hispanic (45.2%) S&E doctorate recipients grew substantially, as did the number of individuals reporting more than one race (50.2%). Over the same period, the number of American Indian/Alaska Native S&E doctorate recipients fluctuated considerably year to year, with a high of 81 in 2007 and a low of 49 in 2006. The proportion of Hispanics among minority S&E doctorate recipients increased 3 percentage points from 2003 to 2008, the proportion of doctorate recipients reporting more than one race increased 1 percentage point, and the proportions of the remaining minority race/ethnicity categories each declined by 2 percentage points or less.

U.S. citizens and permanent residents who were members of minority groups earned 2,903 non-S&E doctorates in 2008, a negligible (0.2%) increase over 2007 and 8.8% more than in 2003. The number of white doctorate recipients in non-S&E fields increased 1.2% during the last year but has declined 2.2% since 2003. The share of non-S&E doctorates awarded to minorities grew from 21.9% in 2003 to 23.8% in 2008, proportions similar to those reported for S&E fields.

The proportion of Hispanics among minority non-S&E doctorate recipients in 2008 (23.5%) was similar to their representation among minority S&E doctorate recipients. The same was true of American Indians/Native Americans (2.2%) and individuals reporting more than one race (6.7%). Blacks earned 41.5% of the non-S&E doctorates awarded to minorities in 2008, and Asians earned 21.9%. From 2003 to 2008 the number of non-S&E doctorates awarded to Asians increased by 23.3%, the number awarded to blacks increased 6.3%, and the total earned by individuals reporting more than one race grew 31.1%. The numbers of non-S&E doctorates earned by American Indians/Native Americans and Hispanics in 2008 were about the same as their corresponding totals in 2003, although the numbers fluctuated year to year.

Citizenship

The number of doctorates awarded to temporary visa holders more than doubled (a 144.3% increase) from 1988 to 2008, a substantially greater rate of increase than was recorded for U.S. citizens and permanent residents (23.6%) during that period (table 3). As a result, the proportion of temporary visa holders grew from 20.0% in 1988 to 23.3% in 1998 and to 33.1% in 2008 among doctorate recipients reporting citizenship status and sex. Most of the growth in numbers of temporary resident doctorate recipients was from 1988 to 1993 (59.2%) and from 2003 to 2008 (43.9%), with a much smaller (6.6%) increase taking place in the 10 years from 1993 to 2003. The number of doctorates awarded to U.S. citizens and permanent residents increased 15.2% from 1988 to 1993, declined 2.0% between 1993 and 2003, and grew 9.4% from 2003 to 2008.

Women are becoming an increasingly large part of the growth in doctorates awarded to temporary residents. The number of male doctorate recipients with temporary visas almost doubled (5,170 to 9,979) between 1988 and 2008, but the number of female temporary resident doctorate recipients increased nearly five-fold (1,071 to 5,267). The proportion of women in the total number of temporary resident doctorate recipients more than doubled to 34.5% over the 20-year period.

TABLE 3. Doctorate recipients, by sex and citizenship status: Selected years, 1988–2008

Year	All doctorate recipients[a]	U.S. citizens and permanent residents				Temporary visa holders			
		Total[b]	Male	Female	% female	Total[b]	Male	Female	% female
1988	31,155	24,914	14,890	10,024	40.2	6,241	5,170	1,071	17.2
1993	38,645	28,709	15,983	12,726	44.3	9,936	7,863	2,073	20.9
1998	40,610	31,168	16,562	14,606	46.9	9,442	6,986	2,456	26.0
2003	38,741	28,146	13,910	14,236	50.6	10,595	7,256	3,339	31.5
2008	46,036	30,790	14,746	16,044	52.1	15,246	9,979	5,267	34.5

[a] Individuals of unknown sex and/or citizenship status are excluded from totals.

[b] Individuals of unknown sex are excluded from totals.

SOURCE: NSF/NIH/USED/NEH/USDA/NASA, 2008 Survey of Earned Doctorates.

The increasing number and proportion of women among U.S. citizen and permanent resident doctorate recipients is also noteworthy. The number of doctorates earned by female U.S. citizens and permanent residents grew 60.1% from 1988 to 2008, but the number of male doctorate recipients in the same citizenship category declined slightly (1.0%). The share of female doctorate recipients has risen nearly 12 percentage points to 52.1% during that span of time.

Postgraduation Plans of Temporary Visa Holders

The postgraduation plans of doctorate recipients with temporary visas have changed over time. Among temporary resident doctorate recipients reporting definite post-graduation commitments, the proportion planning to take positions in postdoctoral research or further training increased from 35.5% in 1988 to 43.5% in 2008, and the share committing to career employment positions declined 8 percentage points, from 64.5% to 56.5% (table 4). The proportion of temporary visa holders who plan to remain in the United States following graduation is also growing. In 1988, 59.5% of temporary resident doctorate recipients with definite commitments for employment or postdoctoral research or training reported an intention to remain in the United States upon graduating; this proportion increased to 78.2% in 2008.

The rate at which temporary resident doctorate recipients reported an intention to remain in the United States after graduation varied by type of postgraduation commitment. Less than half (46.8%) of temporary residents with definite commitments to career employment positions planned to remain in the United States after graduation in 1988, whereas almost three-quarters (74.1%) did in 2008. The proportion of those with definite commitments to postdoctoral research or training positions located in the United States has remained at approximately 80% over the past 20 years.

The postgraduation location plans of temporary resident doctorate recipients varied by broad field of study (figure 2). Among temporary visa holders with definite postgraduation commitments, those earning doctorates in engineering fields in 2008 were most likely (84.8%) and those earning education doctorates were least likely

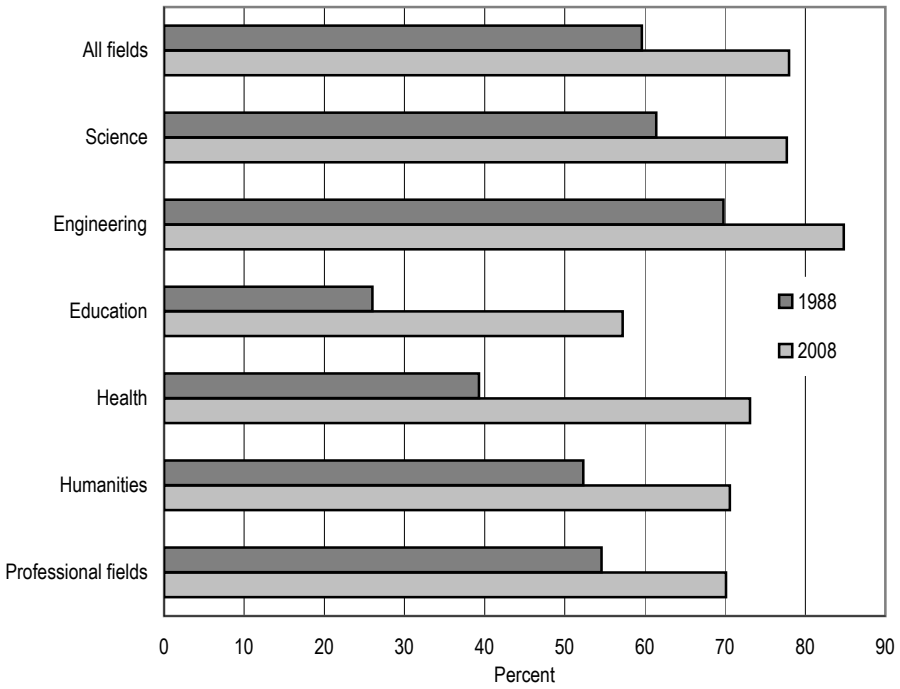
TABLE 4. Postgraduation plans and location of temporary visa holders with definite commitments: Selected years, 1988–2008

Postgraduation plan and location	1988	1993	1998	2003	2008
All temporary visa holders	6,241	9,964	9,462	10,595	15,246
Definite postgraduation commitments[a]	3,907	5,266	5,597	6,747	9,059
Employment	2,519	3,198	3,428	3,826	5,118
U.S. location	1,178	1,350	2,008	2,191	3,793
Non-U.S. location	1,341	1,848	1,420	1,635	1,325
Postdoctoral research or further training	1,388	2,068	2,169	2,921	3,941
U.S. location	1,148	1,583	1,820	2,439	3,295
Non-U.S. location	240	485	349	482	646

[a] Excludes individuals who did not report postgraduation plans and location.

SOURCE: NSF/NIH/USED/NEH/USDA/NASA, 2008 Survey of Earned Doctorates.

FIGURE 2. Temporary visa holders with plans to stay in the United States after graduation, by field of study: 1988 and 2008



NOTE: Percentages based on those with definite commitments to employment or postdoctoral research with response to location.

SOURCE: NSF/NIH/USED/NEH/USDA/NASA, 2008 Survey of Earned Doctorates.

(57.2%) to plan to stay in the United States after graduation. The rate at which temporary resident doctorate recipients plan to remain in the United States increased from 1988 to 2008 in every broad field of study, with the largest increases (more than 30 percentage points) occurring in education and health fields and with substantial increases (more than 15 percentage points) in all other broad fields.

Data Notes

The data presented here are from the Survey of Earned Doctorates for the academic year 2008 (1 July 2007 to 30 June 2008). Each individual completing requirements for a research doctorate from a university in the United States or Puerto Rico receives the SED. Research doctoral programs are oriented toward preparing students to make original contributions to knowledge in a field and typically entail writing a dissertation. Doctoral degrees such as the PhD, DSc, and research EdD are considered research doctorates and are covered by this survey; professional degrees (e.g., MD, DDS, JD, and PsyD) are not. For convenience throughout this report, the terms "doctorate" and "doctoral degree" are used to represent any of the research doctoral degrees covered by the survey.

In 2008, 92.1% of the 48,802 new doctorate recipients completed the survey. The field of study information used in this report was obtained for all 2008 doctorate recipients, information on sex was obtained for 99.9%, race/ethnicity for 93.4%, and citizenship status for 94.3%.

This survey is sponsored by six federal agencies: the National Science Foundation, the National Institutes of Health (U.S. Deparment of Health and Human Services), the U.S. Department of Education, the U.S. Department of Agriculture, the National Endowment for the Humanities, and the National Aeronautics and Space

Administration. Additional data for all fields of study will be presented in the forthcoming interagency report, *Doctorate Recipients from U.S. Universities: Summary Report 2007–08,* fall 2009.

The major fields and subfields of study are reported differently in this InfoBrief than in the SED questionnaire instrument and the *Doctorate Recipients from U.S. Universities: Summary Report 2007–08.* In this InfoBrief, the major field "health" is in the non-S&E category rather than in S&E; the fine fields American/U.S. studies, archeology, and history, science, and technology and society are counted in social sciences (S&E category) rather than humanities (non-S&E category); agricultural economics is included in social sciences rather than agricultural sciences; and public administration is counted in social sciences (S&E category) rather than professional fields (non-S&E category).

For more information on doctorates awarded in S&E fields, the full set of detailed tables from this survey will appear in forthcoming reports of the *Science and Engineering Doctorate Awards* series, at http://www.nsf.gov/statistics/doctorates/. Individual detailed tables from recent surveys may be available in advance of publication of the full reports. For further information, please contact the author.

Notes

1. Mark K. Fiegener, Human Resources Statistics Program, Division of Science Resources Statistics, National Science Foundation, 4201 Wilson Boulevard, Suite 965, Arlington, VA 22230 (mfiegene@nsf.gov; 703-292-4622).

2. Minority groups include American Indian/Alaska Native, Asian, black, Hispanic (which includes Mexican American, Puerto Rican, and other Hispanic), Native Hawaiian/Other Pacific Islanders (included in the "other" race/ethnicity category), and persons who reported more than one racial background.

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